Chemical Reaction Terms

Term	Definition	Units	Example
Stoichiometric Equation	Balanced Eqn		$N_2 + 3H_2 \Longrightarrow 2NH_3$
Stoichiometric Coefficient (ν_i)	Coefficients of stoich eqn that balance eqn, negative for reactants		$\nu_{N2} = -1$, $\nu_{H2} = -3$, $\nu_{NH3} = 2$
Stoichiometric Ratio (S.R.)	Molar ratio in stoichiometric eqn		1 N_2 / 3 H_2 in example above
Stoichiometric Proportion	If actual molar ratio in system equals the S.R.		If you really have a 1:3 N_2/H_2 molar ratio
Limiting Reactant	Whichever reactant has less than stoichiometric proportion		If 1 mole N_2 and 2 moles H_2, H_2 is the limiting reactant
Excess Reactant(s)	Reactant(s) with more than stoichiometric proportion		N_2 in box above
Stoichiometric Requirement	Stoichiometric amount needed	Moles	If you have 1 mole N_2, the stoichiometric requirement is 3 moles H_2
Percent Excess	% above stoich. proportion $(n_i-n_{i,stoich})/n_{stoich} \times 100\%$	%	If you have 4 moles H_2, 1 mole N_2 (4-3)/3 = 1/3 = 33% excess H_2
Fractional Conversion (f_i or X_i)	Relative amount of feed reactant converted $\frac{n_{i,0} - n_i}{n_{i,0}}$	fraction (or %)	Start with 3 moles H_2, end with -.3 moles H_2 F = (3 – 0.3)/3 = 0.9, or 90% conversion
Extent of Reaction (ξ)	Amount reacted, normalized to the stoichiometric equation $\xi = \frac{n_i - n_{i,0}}{\nu_i}$	Moles	In box above, ξ = (0.3 – 3.0)/(-3) = 0.9 moles
Yield	$\frac{mole\,of\ desired\ product}{\max\ possible\,moles\,at\,complete\,conversion}$	fraction	See worksheet
Selectivity	$\frac{moles\,of\ desired\ product}{\sum moles\,undesired\ products}$	fraction	